From: Shuman Moore [shumanmoore@advancedthermalsystems.com]
Sent: Thursday, January 31, 2002 9:45 AM
Subject: Advanced Thermal Systems Comments to the Draft ERIP
Dear Ms. Doll,

As requested by Mr. Blevins in our meeting on 1-28-02, Advanced Thermal Systems (ATS) has provided further comments to the draft ERIP. In general, ATS believes the draft ERIP is a well written document with accurate information.

Consistent with the draft ERIP, ATS believes there now exists a unique opportunity for the CCPCFA to dramatically improve the cost, cleanliness and availability of power in California. The CCPCFA can now significantly increase the amount of zero-emission, renewable, geothermal energy in California (at costs that are competitive with or better than conventional gas fired combustion turbine combined cycle power), and do so as an active participant while avoiding election year funding challenges and securing a revenue stream for the CCPCFA.

We have attached two documents. The first document, titled "ATS Comments....1-31-02", is our response to the ERIP generated by the meeting we had on 1-28-02 with Messrs. Blevins, Flynn and Heath. This document contains several concepts (with supporting data and technical discussion) on how the CCPCFA can not only do specific, low-cost geothermal power projects, but also how the CCPCFA can "partner" with the best technology available to more quickly, efficiently and economically meet the objectives of the ERIP (i.e., the ATS Kalina Cycle Technology for geothermal power generation). This "partnering" concept is somewhat new for California but has been done elsewhere and could be done in several formats (joint ventures, consortiums, lessor/lessee arrangements, BOOT, etc.).

The second document is the "Memorandum to Tom Flynn" that generated the 1-28-02 meeting mentioned above, and it supplies some background concepts and data on the Kalina Cycle geothermal process, as well as serving as a reference for the first attachment.

ATS is confident that Kalina geothermal power can be a major contributor to improving the California energy situation. We are available at your convenience to discuss the attached concepts in detail so that the CCPCFA can benefit from the opportunity now available.

Thank you for your time and consideration,

Shuman Moore
Executive Vice President
Advanced Thermal Systems, Inc.
775-321-4444 X3016

Advanced Thermal Systems, Inc.

1-31-02

Ms. Laura Doll - CEO
California Consumer Power and Conservation Financing Authority
901 P Street, Suite 142A
Sacramento, CA 95814

Subject: Comments to the CCPCFA ERIP:
Geothermal Development in California through the California Power Authority

Dear Ms. Doll,

Advanced Thermal Systems (ATS) has reviewed your "Staff working draft for public comment of the ERIP plan" titled *Clean Growth: Clean Energy for California's Economic Future*, and wish to submit the following comments.

First ATS would like to applaud the people who put together this document because it appears well conceived, contains accurate information and is appropriate to the needs of California.

ATS recognizes the need for sufficient reserve capacity to create an orderly market and agrees with the need for the additional 8,000 MW of new capacity to provide for both reserve requirements and to stabilize the market-pricing model. We are concerned about the State's ability to provide this amount of capacity before the middle of 2006 considering the current chaos in the energy sector and the problems that this instability has caused in California. We do concur that if these supply issues are not solved quickly the market will return again to extreme volatility and the State and the consumers will suffer.

Since the CCPCFA (CPA) has taken the position that ownership of these new assets is critical to accomplishing its' goals, ATS remains concerned about the CPA's ability to procure the funds in sufficient time to provide for the timely construction of the needed assets.

ATS concurs with the assumption that all projects requiring fuel resources from outside of California represent a negative State balance of trade, and that these expenditures have a negative effect on the economic strength of California. Natural gas is the primary fuel being utilized in most of the new electric generation. Most of the natural gas for these new facilities will be brought in from outside of California creating a negative balance of trade and producing most of the related jobs in other States.

Natural gas is a fossil fuel and therefore creates undesirable greenhouse gas emissions. To the level possible, it will be desirable to minimize the utilization of fossil fuels in order to minimize the generation of pollution in the State.

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We also concur with the position that a major present and future issue is the state of the transmission system. Bottlenecks currently exist that cause price variations through out the State. As the demand for electricity increases the elimination of these bottlenecks will become even more important.

The bottleneck issue, on the other hand, can be minimized through the prudent development of well-positioned generation that by-passes the problem areas. In effect, it may be more cost effective to develop appropriately positioned generation than to embark on an extensive transmission system up-grade. Some transmission modifications will be required even with this approach, but the cost for these up-grades will be minimized.

ATS agrees with the planned development of as much "renewable" energy as possible at costs that impose the least potential impact on the consumers. We believe that the CPA can substantially contribute in the development of a 17% renewable energy portfolio.

California is uniquely blessed with a significant amount of un-developed medium temperature geothermal potential that we believe represents a tremendous opportunity for the CPA. Each megawatt of zero-emissions Kalina Cycle (as described below) geothermal energy that displaces a megawatt of fossil fuel based energy not only has a positive impact on trade, but it creates jobs in California and displaces fossil generated pollution.

ATS believes that there now is a great opportunity for the CPA to access a new, proven technology to meet a large portion of the needs of California and the intent of the ERIP. This opportunity can be structured in a partnering manner between the CPA and ATS to the significant benefit of all, as discussed in the following.

TECHNICAL & COMMERCIAL CONSIDERATIONS:

Advanced Thermal Systems has obtained the exclusive United States rights to the "Kalina" cycle technology for geothermal applications. Kalina technology is a proven, break through technology that provides zero-emissions geothermal energy. The Kalina cycle can use the much more abundant and more easily accessed medium temperature hot water resources on a significantly more efficient (20% to 40%) and lower cost basis (20% to 30%) than any other geothermal energy process. It has been estimated that over 23,000 MW of medium temperature geothermal capacity can be developed in the western US if the resources are fully utilized. A significant percentage of this undeveloped capacity resides in California.

The Kalina cycle technology is important because it reduces the average capital cost for construction of medium temperature geothermal plants from over $2,500/kw to approximately $2,000/kw or below, on a fully developed and installed basis. In addition, the Kalina technology is at least 20% more efficient that the current Organic Rankine Cycle technology plants. This combination of higher efficiency and lower capital costs provides base load energy and capacity at price levels that are below the average levels for new, gas fired combined cycle combustion turbine plants.

The CPA estimated that the average cost for capacity and energy from a new combined cycle plant would be $0.043/kWh. This figure represents the average construction cost in combination with the average delivered price for natural gas in California.

ATS has estimated that the average cost for power generated in the Kalina cycle plants will be less than $0.04/kWh, even when considering private ownership and standard bank financing. This concept was described in a previous letter and remains valid. At the same time, the average cost of electricity for CPA may be improved by a public/private partnership that includes the CPA.

An analysis of the current cost for "hourly" spot market power pricing indicates that the current cost should be approximately $0.038/kwh. This price has been derived by attempting to eliminate the short-term anomalies in the power market along with an examination of the long-term trends in the industry. Using this methodology and the fact that almost all of the newer generation has been developed with natural gas as a fuel, we believe that the spot market pricing will continue to escalate, based on both load growth and the trends in natural gas pricing at slightly above the average inflationary rate. Although the current inflation rate is low, the average inflation rate over time is approximately 2.5%. We also believe that the current national trends toward higher spending on both the military and home-land-security could easily cause deficit spending for several years. This higher spending level would, in all likelihood, increase the levels of inflation to a somewhat higher level.

PARTNERING COMCEPT:

A partnering association between ATS and the CPA could take a number of forms that could provide a revenue stream to the CPA. More so that ATS, the CPA has the knowledge and resources to determine what forms will be legally and economically attractive to the CPA. ATS is very flexible relative to structuring a relationship with the CPA that would serve the State and ratepayers well, and with all due respect to the CPA and its possible administrative issues on partnering, ATS has taken the liberty of providing some suggested partnering concepts below:

Option 1 – CPA ownership:

ATS provides the technology, operations and maintenance services and the CPA provides the projects. ATS will willingly act as a developer of projects for the CPA using its exclusive Kalina cycle technology. Projects may be developed under this arrangement where ATS develops and operates the plants while CPA provides funds through bonding to cover the construction cost and development expenses.

The CPA can be instrumental in securing geothermal resource land that helps in minimizing transmission issues in California. Fortunately, medium temperature geothermal resources exist in both southern and northern California that can be developed in an orderly manner.

If State bond funding is utilized for these projects, it may be possible to extend the financing for as much as 30 years at the currently available low interest rates. As an example, if the plant total cost was $2,000/kw and the project were funded with 30 year project revenue bonds that were retired uniformly over the project, at a funding rate of 6.5%, then the average cost for the capacity portion of the contract would be $0.0178/kwh.

We believe the total cost for the variable cost of operations and maintenance will be approximately $0.015/kwh for these dispersed facilities. This variable component would escalate with the CPI or some other appropriate index.

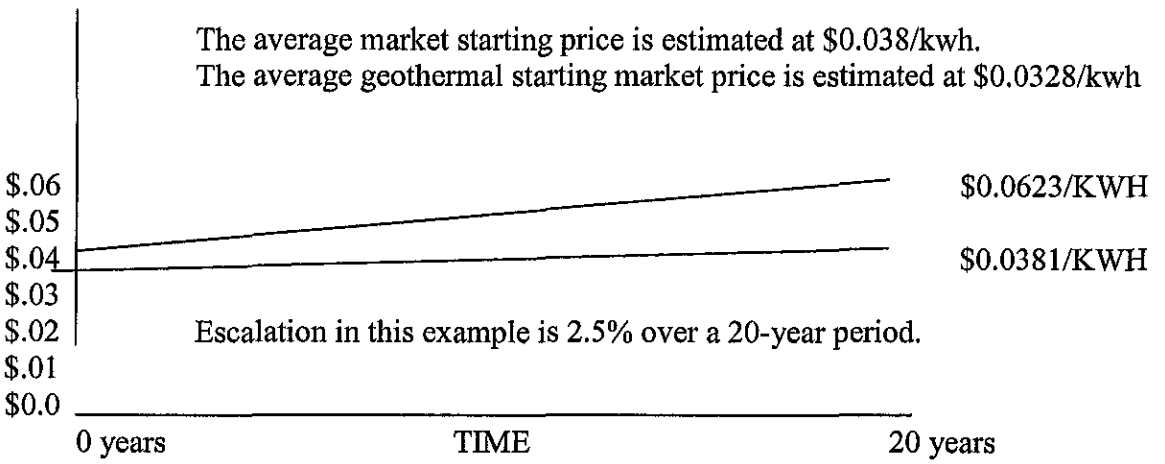
Therefore the total cost for this generation will be $0.0328/kwh at the high side of the transformer. This represents an average cost that is far below any other renewable energy, has availabilities in the high 90's (e.g., >99% availabilities) and is well below the cost for natural gas combined cycle operations. Plus it can be firmed for terms as between 20 and 50 years!

An examination of the average hourly cost of energy over the past five years should indicate that the State would have little or no downside risk associated with the construction of these facilities along with the sale of energy on a spot market basis. We believe that this analysis would indicate that the average hourly cost of energy, even in the currently depressed energy market, will be approximately $0.038/kwh or above.

We also believe that energy costs escalate at an average rate similar to the general economy. If that rate has average approximately 2.5% per year over the past several years, then we would project the average rate of competitive energy to rise at a similar rate.

Geothermal projects are unique in that there is no actual fuel cost, therefore, there is no fuel cost risk to be considered. The O&M portion of the contract should escalate uniformly over time at the same average rate as the economy at large. Since the jobs and costs are all in California, this effect in real terms is meaningless. From a cost perspective, this can be represented on the following graph.

AVERAGE COST OF HOURLY ENERGY



Clearly, this approach can satisfy the needs in California to stabilize the market by adding available capacity (e.g., 1000MW or more of Kalina geothermal would have the effect of establishing a natural market cap on the cost of new energy in California). In fact, this approach may assist in actually reducing the average cost of energy in California while increasing the amount of renewable, non-polluting available capacity and energy.

Option 2 – Private ownership with some public funding:

Even though public ownership appears to represent a viable option for geothermal capacity that is developed utilizing the Kalina technology. Because of the tax-advantaged position enjoyed by geothermal projects, private ownership may also provide some significant long-term advantages.

Privately owned geothermal projects enjoy some unusually advantageous tax treatments as outlined below:

1. Geothermal projects can take advantage of a 10% energy tax credit.

2. Geothermal projects can take advantage of a 5 year depreciation schedule known as 5 year MACRS.

3. Geothermal projects qualify for depletion allowance deductions on the portion of the project that is related to the mining operation. This could be defined as the revenues associated with the Operations and Maintenance portion of the contract (e.g., in this case $0.015/kWh with escalation).

4. In California geothermal projects qualify for credits of up to $0.015/kWh from CEC. On average this credit will amount to approximately $0.0075/kWh for the first five years of operations.

5. Geothermal projects may qualify for Industrial Development Bonds for a portion of the capital cost. This will reduce the average cost of debt financing for the project.

6. Production Tax Credits (PTC) of as much as $0.015/kWh, although not available now for geothermal energy, are widely expected to be available in the near future (Senators Tom Daschle and Harry Reid are pushing this legislation in Washington now)

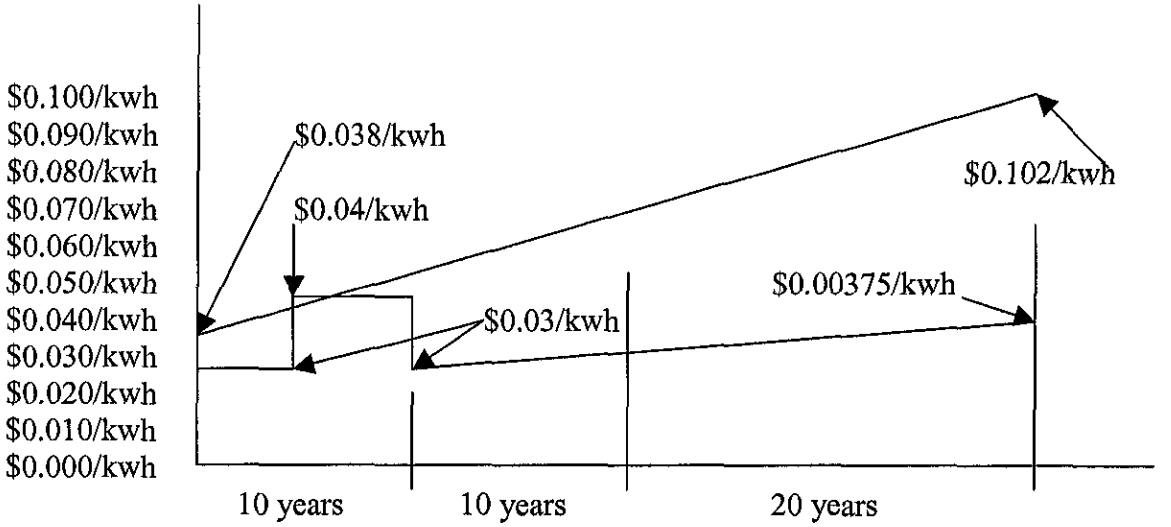
With a private ownership concept, the following plan would be utilized:

The CPA would provide determine the amount of generation and most desirable geothermal locations to be developed and commit to the purchase of the power. The CPA would also assist in land acquisition and/or leasing of property to minimize the associated costs.

ATS would develop, own, operate and provide equity to the projects being developed. Investors in the projects would receive the benefits shown above and a reasonable return on their invested capital.

The CPA would have an option to purchase the projects at a date to be determined based on the full utilization of the tax benefits by the owners. The CPA would re-finance the projects at a reduced capital cost level for the remaining life of the projects.

The general economics of this arrangement are shown in our previous correspondence, but a graphic representation over a 40-year period is shown below:



Clearly, the approach of using a public/private organizational structure provides a significant long-term advantage for the State. Not only do the State and the consumers benefit by having lower long-term energy costs, but this approach completely avoids the current issues associated with passage of a bond issue during in this election year.

Option 3 – Public/Private Consortium:

A third possible partnering arrangement is a consortium of the CPA, ATS, a turnkey EPC contractor (i.e., Bechtel) and an equipment supplier that would jointly develop, own and operate the projects. This would be similar to a structure that was developed on the Husavik, Iceland Kalina geothermal project that has been in operation since mid-2000. This concept can be discussed in more detail should the CPA find it interesting.

Conclusions:

The CPA, electricity consumers and environmentalists can benefit significantly from the development of an aggressive medium temperature Kalina cycle geothermal development plan. It may be possible to develop more than 1,000 MW of cost-effective geothermal power in California without looking to resources in other States.

This approach will provide new jobs in California, improve California's air quality and reduce inter-state trade deficits.

Both a publicly owned approach or a private/public ownership approach shows great promise and significant savings. The private and then public approach appears to show greater savings and avoids some of the current funding problems.

It appears that either approach will provide energy to the market at prices well below the projected annual spot market-pricing model. If the CPA chooses to sell at their average cost rather than the spot market price, considerable savings will pass through to the consumers. This will enable the CPA to fulfill their basic role of controlling pricing to benefit the State's consumers.

MEMORANDUM

DATE: JANUARY 21, 2002

FROM: ADVANCED THERMAL SYSTEMS and FAR WEST ENERGY

TO: TOM FLYNN – CCPCFA

SUBJECT: MEETING POWER NEEDS IN CALIFORNIA
(Relative to the CCPCFA Request for Comments on the draft ERIP)

INTRODUCTION:

According to your best information, California will require an additional 8,000 MW of new capacity before 2006. At the same time, California wishes to reach 17% renewable resources by that same date.

The CCCFA wishes to accomplish these goals at the lowest cost to the consumer and does not want to take unnecessary risks.

Accordingly, Far West suggests the following as a practical, economical plan to meet the CCPCFA objectives:

GEOTHERMAL POTENTIAL:

Geothermal energy provides reliable capacity and has no environmental impact. Advanced Thermal Systems, Inc., with its affiliate Far West Energy, has the exclusive United States license for geothermal applications of the "Kalina" cycle technology. This is a breakthrough, zero-emissions, renewable power generation technology that is both more efficient and less expensive than previously available systems, allowing typically unavailable medium temperature geothermal resources to not only be lower cost than other geothermal power, but also be at a lower cost than gas turbine combined cycle power plants whenever gas cost is greater than $3.00 per million Btu, delivered (which it generally is).

Because of the tax advantages that are available for geothermal projects, it will be more desirable for the projects to be privately owned. But, the CCPCFA could assist the price equation by facilitating low cost bond financing and could provide a PPA for the electrical output

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The logic behind the private capital approach:

1. Geothermal projects can take advantage of a 10% Energy Tax Credit.

2. Geothermal projects can utilize a 200% declining balance 5 year MACRS depreciation approach.

3. Geothermal projects can take advantage of a 15% tax depletion allowance on the portion of the revenue that is associated with the resource mining. (approximately 30% to 50% of the revenue stream)

4. Privately owned geothermal projects can apply for credits of up to $0.015/kwh through CEC for the first five years of their existence. Typically the amount available is closer to $0.0075 to $0.01/kwh.

5. If long-term (20 year or more) tax-exempt bond financing was provided at market rates the cost of capital would be extremely reasonable.

Current pricing shows the total capital required for these project, including both debt and equity, would be around $2,000/installed, deliverable kW of capacity. In other words, a 32 MW average net output plant would cost $64 million dollars.

California has an abundance of undeveloped medium temperature geothermal that is spread around the State. Considering the above factors, private equity can be raised at reasonable rates to cover 30% of the capital cost with California Industrial Revenue bonds covering the balance of the costs.

When all of this is factored together, it should be possible to provide reliable "Green" base load power in California for $0.03/kwh (while the CEC credits are available) with modest escalation during the first five years. The price would need to step up to compensate for the loss of the CEC credits after the first five years. This low average price of geothermal power represents a true cost savings to consumers even when compared to combined-cycle natural gas plants.

This pricing structure would be cost beneficial for the consumers and would help to meet the CCPCFA goals for "Green" energy. Because CCPCFA has indicated a desire for project ownership, we would also include the possibility for CCPCFA to purchase these facilities when the tax advantages have been exhausted. This feature represents the best picture for the rate-payers. Our company would then enter into a fairly standard Operations and Maintenance agreement that would extend for the life of the projects.

We would be willing to take on the responsibility for developing up to 1,000 MW under this program. The contracts would need to have some adjustments available for land acquisition, etc., but we believe this is a realistic opportunity for the CCPCFA to make a real step forward in their efforts. We also believe that this would go a long way toward reaching both the "Green" requirements and the cost limitations that may be required. This is a great opportunity for the CCPCFA to show strong vision and leadership.

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Peaking and reliability:

The CCPCFA has a need to insure that an additional 8,000 MW of new capacity is available by 2006. This capacity will need to be distributed throughout the State to minimize transmission issues. The CCPCFA wishes to own most, if not all, of this capacity.

It is assumed that the CCPCFA is obligated to serve a leadership role for "Green" energy. As such the CCCFA may purchase or develop various types of projects including base load, intermediate load and peaking load.

Outside of the need or desire to foster development of "Green" assets, there is no reason for any more than 10% to 15% of this new capacity to be in the form of either base load or intermediate load generation. The CCPCFA could satisfy its basic mission at the lowest possible cost by development of mostly "only peaking" generation. This direction would place the least possible burden on the rate-payers and would provide the lowest investment and lowest risk position for the State.

Conclusions:

ATS/Far West hope this information is valuable to the CCPCFA planning effort and we are available for meetings and discussions on this topic at your convenience. A very cost effective strategy can be developed that protects the public, provides needed power additions and demonstrates a well considered energy and political policy for California.

Advanced Thermal Systems, Inc and its affiliate Far West Energy, Inc.

Mack Shelor
Senior Vice President

Shuman Moore
Executive Vice President